

RISK MANAGEMENT BENEFITS OF OPTICAL SENSING AND VARIABLE RATE TECHNOLOGY IN COTTON PRODUCTION**James A Larson****University of Tennessee****Knoxville, TN****Chris Boyer****University of Tennessee****Melissa Stefanini****University of Tennessee****Knoxville, TN****Dayton M Lambert****University of Tennessee****Knoxville, TN****Xinhua (Frank) Yin****University of Tennessee****Jackson, TN****Hugh J. Savoy****University of Tennessee****Knoxville, TN****Michael Buschermohle****University of Tennessee****Knoxville, TN****Donald D Tyler****University of Tennessee****Jackson, TN****Jac Varco****Mississippi State University****Mississippi State, MS****Brenda Tubana****Louisiana State University****Baton Rouge, LA****Peter Scharf****University of Missouri****Columbia, MO****Abstract**

This study evaluated the risk management benefits of optical sensing and Variable Rate Technology (VRT) to manage N in cotton production. Data collected from 29 field trials in Louisiana, Mississippi, Missouri, and Tennessee from 2011 to 2014 included lint yields and N rates calculated from three N treatments: the existing farmer practice (FP), VRT using optical sensing, and VRT using optical sensing and yield monitor or remote sensing. Two statistical models were used to determine effects of soils, landscape, and weather on VRT versus FP N management with respect to lint yields, net returns, N rates, and N efficiency. The ANOVA model measured soil, landscape, and weather effects on mean treatment differences between VRT and the FP. The logistic model determined the risk (probability) of lint yield and net return losses using VRT relative to the FP. The models were used to identify field conditions where VRT was profitable, provided risk management benefits, and improved N efficiency. VRT may provide risk management benefits on fields with greater water holding capacity, higher organic matter, or deeper soils. Fields with silty or loamy soils would likely benefit from VRT in terms of N cost savings and environmental benefits because of a higher probability of VRT producing lower N rates than the FP. In addition, enhanced N efficiency is more likely on a loamy soils. However, the potential environmental benefits on these two soils may be obtained at the cost of a higher likelihood of lower lint yields and net returns.